Space Weather Forecast

Issued on Sunday, 06 August 2023 at 01:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate storm likely at times from Coronal Mass Ejection arrivals. R1-R2 Radio blackouts likely. Further S1/Minor Radiation Storm expected in the near term.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: High, with three Moderate flares and a Strong flare in the last 24 hours. Peak flare was a Strong flare from the active region in the northwest, other Moderate flares were also observed from this region. This is a compact region, primarily composed of two moderately sized spots, but with surrounding small spots leading to increased complexity. Another region also in the northwest has shown some growth, with the further emergence of a small spots to its southeast, and increased activity looks possible for this region. The other six numbered regions currently on the disc are all so far have been relatively stable, and either mature regions, or smaller regions. The largest of these is in the southeast, however this is currently a simple spot. The recent Strong flare from the northwest at 05/2221 UTC has produced a significant CME (coronal mass ejection), currently awaiting imagery and analysis, with updates to the forecast likely in future issues.

Solar Wind / Geomagnetic Activity: A CME was observed arriving at 05/0209 UTC, likely the early arrival of one that was anticipated to arrive on 06 Aug. This showed a small increase in wind speeds from background levels of 380km/s to 450km/s, before easing again. The total interplanetary magnetic field strength was Moderate to Strong, due to a previous CME arrival on 04 Aug, but then increased to be persistently Strong between 05/0220-0800 UTC in response to the new CME arrival. This then eased to be Weak at the end of the period. The north-south component, (Bz) was generally southward (negative) initially and strongly southward at times, but became generally weakly positive from 05/1000 UTC. Geomagnetic activity was Unsettled to Active to start, with G1-G2 Minor/Moderate Storm 05/0000-0900 UTC due the CME arrival, but declined to Quite from 05/1200 UTC.

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) rose in response to the long duration Moderate flare, reaching the S1/Minor Storm threshold by 05/1115 UTC, easing back towards the S1 threshold or just below by the end of the period.

Four-Day Space Weather Forecast Summary
Solar Activity: Further Moderate flares are likely initially, mainly from the two regions in the northwest, with a

decreasing chance of flares from day 2 (7 Aug) onwards. Overall activity into the period High initially but expected to reduce to become Moderate to Low.

Solar Wind / Geomagnetic Activity: Waning CME influence is likely day 1. Next CME enhancement is likely to be day 2 or day 3 (7 or 8 Aug) from recent flare activity, although analysis continues on these complex eruptions. Overall geomagnetic activity is likely to be

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mainly Quiet initially, with isolated Unsettled spells day 1 (6 Aug). CME arrivals will likely increase this again to Active to G2 Moderate Storms for periods on day 2 or day 3 (7-8 Aug), declining in an uncertain manner into day 4 (9 Aug) pending further CME analysis.

Energetic Particles / Solar Radiation: Solar radiation is currently around the S1 Minor Storm Level, due to waning enhancement from yesterday moderate flare the northwest disc. These values were gradually declining in the near term. Further enhancement back above the S1 Minor Storm Level is expected day 1 (6 Aug) due to the recent strong flare from that same region however, with a slight chance of values reaching towards S3 Strong Storm Levels. Any further elevated levels perhaps only easing into day 2 (7 Aug).

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	20	60	60	40
Strong	G3	No	1	10	10	5
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	60	40	30
Very Active	R3 to R5 X	Yes	10	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	80	40	10	5
Very Active	≥ S3 *	No	10	5	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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